

# The State of the Art in Electrochemical and Electro-discharge Micro Technologies

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**Abstract.** For the main unconventional removal processes belong Electrochemical (ECM) and Electrodischarge (EDM) machining processes. These processes can be applied for shaping advanced conductive materials which are difficult or impossible for machining using conventional methods. In electrochemical removal machining the **workpiece is an anode** and material is removed as a result of electrochemical dissolution process. This mechanism of material removal makes it possible to obtain high metal removal rate and good surface layer quality when machining **micro and nano parts** made of super- alloys, alloys, steels and some composite materials on metallic base. The electrodischarge machining (EDM) can be applied mainly for removal manufacturing processes. Here very important are parameters and conditions of electrical discharges occurring in into-electrode area. In order to reach the high quality details very often ceramic or composite materials on metallic or ceramic base are being apply. In case when machined materials are at least partly conductive for electrical current, rational solution is application of hybrid electrochemical – electrodischarge (ECDM) process. In case of shaping ceramic uncondutive materials the rational solution can be application of modified ECDM process named as: Spark Assisted Chemical Engraving.

Chemical Engraving (SACE) (Fig.1).

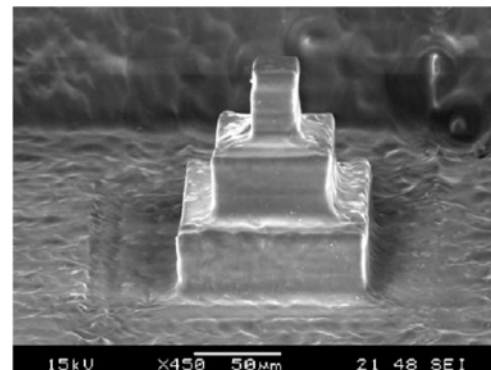
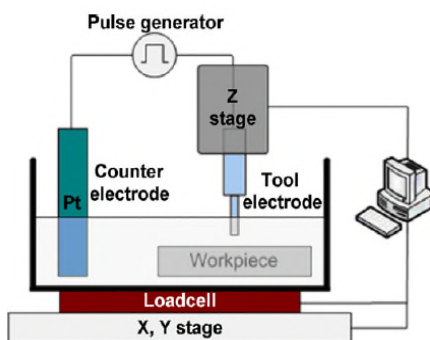


Fig. 1. Scheme of test stand for SACE machining (on the left) and micro-detail made of glass (on the right) shaping in SACE process.

**In the paper state of development in the range of research and practical applications of above mentioned ECM, EDM, ECDM and SACE processes will be presented.**